DOCUMENT RESUME

ED 120 904 EA 008 028

AUTHOR Schrader, Charles F.
TITLE You and Your Architect and Energy Conservation Savings for Educational Facilities. A Report.
INSTITUTION American Inst. of Architects. Northern Calif. Chapter.
PUB DATE 2 Apr 76
NOTE 8p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage
DESCRIPTORS *Administrator Guides; *Architects; *Architectural Programing; Building Design; Building Improvement; Cost Effectiveness; *Educational Facilities; *Energy Conservation; Fuel Consumption; Illumination Levels; Lighting; Operating Expenses

ABSTRACT

Estimates from a number of reliable sources indicate that reductions in energy consumption are possible in both existing and new facilities. Estimates vary from 25 to 50 percent for older buildings and 50 to 80 percent for new construction. Prudent school administrators should take stock of their physical facilities and look for possible ways to save on energy consumption. Architects are prepared to perform an energy consumption analysis of an existing plant and offer a constructive program of facilities modification to conserve energy. Designing new facilities with energy conservation as a major design component, architects are prepared to work with school officials from the initial program development and site selection through to completed project. Lists briefly illustrate energy conservation possibilities that can be implemented in (1) current buildings by existing staff, (2) the modification of existing facilities, and (3) the design of new facilities. (Author/MLF)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED120904

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Draft April 2, 1976

YOU AND YOUR ARCHITECT AND ENERGY CONSERVATION

SAVINGS FOR EDUCATIONAL FACILITIES

A Report Prepared By The

EDUCATIONAL FACILITIES COMMITTEE

NORTHERN CALIFORNIA CHAPTER AMERICAN INSTITUTE OF ARCHITECTS

CHARLES F. SCHRADER, AIA

For The Committee

EA 008 028

YOU AND YOUR ARCHITECT AND ENERGY CONSERVATION

SAVINGS FOR EDUCATIONAL FACILITIES

A REPORT PREPARED BY THE
EDUCATIONAL FACILITIES COMMITTEE
NORTHERN CALIFORNIA CHAPTER AMERICAN INSTITUTE OF ARCHITECTS

BACKGROUND

In the United States, our buildings today use approximately one third of the energy consummed annually. Our Schools and Colleges consume a large amount of this energy due to their relatively high level of occupancy and their need for high levels of illumination, ventilation, heating and cooling and water. Further, schools are serving a greater segment of population with the growth in adult programs. Facilities are often used at night and on weekends for educational and community activities. In many instances, these facilities now operate on a year around basis. Consequently, their demands on resources, energy systems and the resultant air and water pollution are increasing in magnitude.

Estimates from a number of reliable sources indicate that reductions in energy consumption are possible in both existing and new facilities. Estimates vary from 25 to 50 percent for older buildings and 50 to 80 percent for new construction. Using an average saving of 30% and 60% respectively, and at an equivalent energy value cost of $12.00 per barrel, savings for 1975 could have been around 20 billion dollars and by 1990 this figure could be around 55 billion dollars, with no allowance for inflation.

Measured in energy quantities, if these savings were now possible, we could reduce by two thirds all of our current import requirements.

It is quite evident that efforts to conserve energy in our schools and college can be of value in many areas; as an aid in stabilizing the educational tax burden, offering "Found" moneys for operational expense, or at least reducing this currently

increasing cost component, and on a broader picture helping our country to achieve a national goal of energy self sufficiency.

Locally we have seen dramatic energy cost increases in the past several years. One Bay Area Community College District which has taken a recent cost survey has found the following statics:

Gas & Electricity Cost

	1974	1975	1976 (Est.
College 1	55,001	90,249	100,200
College 2	163,136	235,546	298,802
College 3	102,871	142,891	174,000

C/O Increase to 1974	1975	1976(Est.)
College 1	64%	82%
College 2	44.5%	83%
College 3	39%	69%

Elementary and Secondary School Districts caught in even tighter budgeting problems are finding these increases particularily more difficult to deal with.

WHAT CAN BE DONE

Prudent Administrators should take stock of their Physical facilities and look for possible ways to save on energy consumption. The following list contains savings ideas which can easily be implemented with current buildings and existing staff.

1. New fluorescent tubes called "Energy Savers" are now available and designed to save 15% in energy consumption with a negligible change in light level.
2. Current Standards for lighting levels are being adjusted downward. Levels of 10 to 40 foot candles are sufficient for visual acuity where levels of 60 to 150 foot candles are now being provided. Emphasis is

placed on quality of light with better contrast and reduced glare.

3. Light levels may be reduced in non-task areas such as corridors and lunch rooms.
4. Prompt cleaning and/or replacement of all heating, ventilating and air-conditioning filters.
5. Careful attention to opening and closing drapes and blinds in an energy efficient schedule.

WHERE CAN YOUR ARCHITECT HELP?

A. Existing Facilities. Architects are prepared to perform an energy consumption analysis of an existing plant and offer a constructive program of facilities modification to conserve energy. Such studies would project cost saving for each improvement to determine by value analysis which group of savings would be most practical for each particular project. A group of programmed saving might include:

1. Adding insulation to the exterior walls and ceiling or roof.
2. Reglazing with insulated and heat reducing glass.
3. Adding elements (trellis, awnings, drapes, blinds, etc.) at large glass areas to reduce energy loss.
4. Add ventilating sash, to allow the option of natural ventilation in lieu of mechanical ventilation and/or air conditioning.
5. Recycling and revising air handling systems to reuse more existing building air and introduces less fresh air. Also, to start up systems later and shut down earlier.
6. Rebalance systems so that corridors, storage rooms and other non-task spaces will be at lower energy consuming temperature levels.
7. Designs for maintaining higher levels of relative humidity in the winter, which reduces ventilation needs and achieves comparable comfort levels at lower temperatures.
8. Reorganize lighting into multi-level and multi-zone lighting systems which will allowable greater flexibility in the amounts and locations of electrical lighting used.

9. At spaces which have natural lighting abilities (windows and skylights) the use of photo-sensitive cells which will add additional lights as the level of natural light diminishes. Savings of as much as 25% of lighting energy can be saved in finger plan type schools with reasonably large amounts of glass area.

10. Introduce task level lighting which may allow great reductions in the general lighting levels.

It must be emphasized again that a thorough plant analysis is essential in determining if a program of savings is feasible, and if so, what particular group of items will offer a balanced package to maximize savings for cost expenditure.

B. New facilities and additions. With a new sense of priorities in today's building designs, architects are now prepared to work with school and college officials from the initial program development and site selection through to completed project, with energy conservation as a major design component. Many practices developed in the last ten to fifteen years of abundant and inexpensive energy which must be reexamined with a critical eye. Vast open spaces, relying to a great degree on mechanical ventilation, and cooling for success must be reappraised. Uniform light distribution systems with levels of 75 to 100 foot candles and switching that controlled multi-bay areas of several thousand square feet also need reanalysis.

The programming process must be alert and sympathetic to these needs for change, and involve instructional and learning activities which can operate within new design parameters.

The following list briefly illustrates possibilities in the design of new construction for energy conservation:

1. Orientation of buildings on sites to best utilize the suns rays, natural breezes and prevailing winds. Use of existing trees, where possible for added solar control.
2. Location of glass in areas least prone to heat gain and/or loss.

3. Development of fully insulated walls and roof.

4. Efficient building shapes. Certain building shapes required less roof and wall area, per gross square foot of floor areas.

5. Solar Energy System, where practical, for alternate sources of heat and electricity.

6. Design of energy efficient, task oriented lighting systems.

7. Utilization of new types of plumbing fixtures which are more efficient in water use.

8. Systems for reuse of "acceptable" water for field and plant irrigation.

While items seven and eight relate to savings in water, not energy, the recognition for conservation of this valved resource is also of importance in site and builders design.

CONCLUSION

Many conservation ideas, products and programs are now either available for use or in a realistic development phases. Architects are constantly monitoring and evaluating these items and offering them as design options when they appear practical for use in building programs.

Working with administrators, board members, and community groups, the architect is your professional team member in any effort directed at reducing and conserving energy at existing educational plants and in the design of new facilities.

Draft - April 2, 1976

for the committee

Charles F. Schrader, AIA

References

1. Daly, L.F. "Energy and the Built Environment". A gap in current strategies, the American Institute of Architects - May 1974.

2. Dubin, F.S. "The Energy School". A demonstration project.

3. Dubin, F.S. "Energy Conservation through Building Design" - a wiser user of electricity. Annual conference of A.P.P.A., June 26, 1972.

4. Stein, R.G. "Spotlight the Energy Crisis". How architects can help, AIA Journal, June 1972.